

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. Contract ID Code Cost-Plus-Fixed-Fee		Page 1 Of 9	
2. Amendment/Modification No.  P00004		3. Effective Date  2007JUL12		4. Requisition/Purchase Req No.  SEE SCHEDULE		5. Project No. (If applicable)	
6. Issued By U.S. ARMY TACOM LCMC AMSTA-AQ-ASGA SHERRI HENDERSON (586)574-8880 WARREN, MICHIGAN 48397-5000 HTTP://CONTRACTING.TACOM.ARMY.MIL WEAPON SYSTEM: WPN SYS: 00 EMAIL: SHERRI.HENDERSON@US.ARMY.MIL		Code W56HZV		7. Administered By (If other than Item 6) DCMA GRAND RAPIDS RIVERVIEW CENTER BLDG 678 FRONT ST., NW GRAND RAPIDS, MI 49504-5352  SCD C PAS NONE ADP PT HQ0337		Code S2303A	
8. Name And Address Of Contractor (No., Street, City, County, State and Zip Code)  ENGINEERED MACHINED PRODUCTS INC N/A 3111 N 28TH STREET ESCANABA, MI 49829-9318  TYPE BUSINESS: Other Small Business Performing in U.S.				<input type="checkbox"/>		9A. Amendment Of Solicitation No.	
				<input type="checkbox"/>		9B. Dated (See Item 11)	
				<input checked="" type="checkbox"/>		10A. Modification Of Contract/Order No. W56HZV-06-C-0467	
				<input type="checkbox"/>		10B. Dated (See Item 13) 2006JUL20	
Code 1HUX0		Facility Code					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended, <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing items 8 and 15, and returning _____ copies of the amendments: (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. Accounting And Appropriation Data (If required) ACRN: AE NET INCREASE: \$545,292.00							
13. THIS ITEM ONLY APPLIES TO MODIFICATIONS OF CONTRACTS/ORDERS It Modifies The Contract/Order No. As Described In Item 14.							
KIND MOD CODE: A							
<input checked="" type="checkbox"/> A. This Change Order is Issued Pursuant To: FAR 52.243-2, Alt V, Changes-CR The Changes Set Forth In Item 14 Are Made In The Contract/Order No. In Item 10A.							
<input type="checkbox"/> B. The Above Numbered Contract/Order Is Modified To Reflect The Administrative Changes (such as changes in paying office, appropriation data, etc.) Set Forth In Item 14, Pursuant To The Authority of FAR 43.103(b).							
<input type="checkbox"/> C. This Supplemental Agreement Is Entered Into Pursuant To Authority Of:							
<input type="checkbox"/> D. Other (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input checked="" type="checkbox"/> is required to sign this document and return _____ copies to the Issuing Office.							
14. Description Of Amendment/Modification (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)  SEE SECOND PAGE FOR DESCRIPTION							
Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. Name And Title Of Signer (Type or print)				16A. Name And Title Of Contracting Officer (Type or print) DEREK MCALEER DEREK.MCALEER@US.ARMY.MIL (586)574-8093			
15B. Contractor/Offeror  (Signature of person authorized to sign)		15C. Date Signed		16B. United States Of America  By _____ /SIGNED/ (Signature of Contracting Officer)		16C. Date Signed  2007JUL12	
NSN 7540-01-152-8070 PREVIOUS EDITIONS UNUSABLE				30-105-02		STANDARD FORM 30 (REV. 10-83) Prescribed by GSA FAR (48 CFR) 53.243	

SECTION A - SUPPLEMENTAL INFORMATION

Modification P00004 to W56HZV-06-C-0467,

1. This bilateral modification is to revise the scope of work and add funding to the option per Section C.6. The scope is revised pursuant to the changes clause, FAR 52.243-2, Alternate V, Changes-Cost Reimbursement.
2. The following changes apply:
- a. Section B, CLIN 0004, narrative B001 is updated.
  - b. Section B, SUBCLINS 0004AC and 0004AD are added to allocate funding for the increased option effort.
  - c. Section B.3, the Cost, Fee, and Total Value for Option Period 1 is changed as follows,

	Cost	Fee	Total Value
Option period 1	\$ 3,076,550	\$ 92,297	\$ 3,168,847
This action	<u>\$ 529,410</u>	<u>\$ 15,882</u>	<u>\$ 545,292</u>
Option Totals	\$ 3,605,960	\$108,179	\$ 3,714,139
  - d. Section C.6.4, the following is added, "In addition to the fifty (50) kits currently being installed with this option, an additional twenty (20) kits are added to expand the validation and verification of the system. The contractor shall focus the additional kits on the Michigan fleet of transit buses in order to limit travel and other expenses."
  - e. Section G, the applicable Accounting and Appropriation Data reflects the increased funding.
3. In consideration of the modification agreed to, this is a complete and final equitable adjustment for the Contractors performance in support of changes contained in this modification and their proposal for adjustment. The Contractor releases the Government from any and all liability under this contract for any further equitable adjustment attributable to this modification.
4. As a result of this modification, the total contract value is increased by \$545,292 from \$6,819,835 to \$7,365,127.
5. All other terms and conditions shall remain the same.

\*\*\* END OF NARRATIVE A0005 \*\*\*

CONTINUATION SHEET		Reference No. of Document Being Continued			Page 3 of 9
		PIIN/SIIN W56HZV-06-C-0467	MOD/AMD	P00004	
Name of Offeror or Contractor: ENGINEERED MACHINED PRODUCTS INC					
ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004	SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS				
	<u>OPTION PERIOD (1) ONE</u>				
	SECURITY CLASS: Unclassified				
	The total funded amount on Clin 0004 is as follows:				
	0004AA \$2,804,000				
	0004AB \$ 364,847				
	0004AC \$ 497,285				
	0004AD \$ 48,007				
	Total Value \$3,714,139				
	(End of narrative A001)				
0004AC	Estimated cost \$3,605,960				
	Fixed fee \$ 108,179				
	Total estimated cost \$3,714,139				
	(End of narrative B001)				
	<u>SERVICES LINE ITEM</u>				\$ 497,285.00
	NOUN: FY07 EMP EXERCISE OPTION #1				
	PRON: R372C236R3 PRON AMD: 02 ACRN: AE				
	AMS CD: 622601H7700				
	<u>Inspection and Acceptance</u>				
	INSPECTION: Destination ACCEPTANCE: Destination				
0004AD	<u>Deliveries or Performance</u>				
	DLVR SCH PERF COMPL				
	REL CD QUANTITY DATE				
	001 0 SEE SECTION F				
	\$ 497,285.00				
	<u>SERVICES LINE ITEM</u>		EA		\$ 48,007.00
	NOUN: NAC CORE				
	PRON: R372C294R3 PRON AMD: 01 ACRN: AE				
	AMS CD: 622601H7700				
	<u>Inspection and Acceptance</u>				
	INSPECTION: Destination ACCEPTANCE: Destination				

Name of Offeror or Contractor: ENGINEERED MACHINED PRODUCTS INC

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	<div>Deliveries or Performance</div> <div>DLVR SCHPERF COMPL</div> <div><div>REL CDQUANTITYDATE</div><div>0010SEE SECTION F</div></div> <div>\$48,007.00</div>				

<b>CONTINUATION SHEET</b>	<b>Reference No. of Document Being Continued</b> <b>PIIN/SIIN</b> W56HZV-06-C-0467 <b>MOD/AMD</b> P00004	<b>Page</b> 5 <b>of</b> 9
<b>Name of Offeror or Contractor:</b> ENGINEERED MACHINED PRODUCTS INC		

B.1      Estimated Cost and Payment

B.1.1    The estimated cost for performance of the work required under this contract is set forth in Section B. In consideration of performance of the work specified under the contract the Government will pay the Contractor the Estimated Cost shown under CLIN 0001. This amount shall constitute the estimated cost for the purpose of the Contract Clause entitled LIMITATION OF COST (Apr 1984), FAR 52.232-20, but neither the Government nor the Contractor guarantee the accuracy of said estimate.

B.1.2    The contractor will be paid the fixed fee stated in Section B under CLIN 0001 for the performance of work under the contract and in accordance with the terms of the Contract Clause entitled FIXED FEE (Mar 1997), FAR 52.216-8. The fixed fee together with the reimbursement of cost shall constitute full and complete consideration for the contractor's service in connection with the work required and performed under this contract.

B.1.3    Allowable cost shall be determined, and payment thereof shall be provided, in accordance with the Contract Clause entitled ALLOWABLE COST AND PAYMENT (Dec 02), FAR 52.216-7.

B.2      Payment

The contractor may submit public vouchers every two weeks for payment under this contract. The fee will be payable at the time of reimbursement of cost at the same rate to such cost as the total fee of this contract bears to the total estimated cost thereof, subject to any withholding pursuant to provisions of this contract.

B.3      Options

The options set forth in C.5 and H.1 will be exercised in accordance with the cost schedule set forth below:

	Cost	Fee	Total Value
Option Period 1 Totals	\$ 3,605,960	\$108,179	\$ 3,714,139
Option Period 2	\$ 4,736,080	\$142,082	\$ 4,878,162
Option Period 3	\$ 4,736,080	\$142,082	\$ 4,878,162
Option Period 4	\$ 4,736,080	\$142,082	\$ 4,878,162

\*\*\* END OF NARRATIVE B0001 \*\*\*

<b>CONTINUATION SHEET</b>	<b>Reference No. of Document Being Continued</b> <b>PIIN/SIIN</b> W56HZV-06-C-0467 <b>MOD/AMD</b> P00004	<b>Page</b> 6 <b>of</b> 9
<b>Name of Offeror or Contractor:</b> ENGINEERED MACHINED PRODUCTS INC		

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

SCOPE OF WORK

C.1 BACKGROUND: The goal of the Phase I and Phase II SBIR was to develop an efficient and modular advanced thermal management system for use on military and commercial vehicles. Engineered Machined Products, Inc.(EMP) has developed a complete thermal management system by reducing parasitic losses and increasing the overall efficiency of the system. This efficiency was increased by electrifying the components of the thermal management system and by improving the oil quality used to lubricate the system and cool the pistons. Using more consistent, higher quality oil reduces engine wear and deterioration, improves heat transfer properties, and ultimately prevents thermal breakdown of the engine. Moreover, the temperature of oil that has a more stable consistency can be more easily controlled to a higher nominal temperature, thereby controlling the oil viscosity and reducing frictional losses.

C.2 OBJECTIVES: The goal of the Phase III SBIR is to produce an efficient and modular advanced thermal management system for use on military and commercial vehicles. EMP, as an independent contractor and not as an agent of the Government, shall provide all necessary labor, materials, supplies, facilities, equipment, and engineering/technical services to produce, militarize and demonstrate primary and auxiliary thermal management components and/or retrofit system (kits) that will efficiently manage thermal loads and the power requirements and controls to run them on a military tactical vehicle while minimizing parasitic energy losses. The optimal thermal management system will obtain a 10% improvement in fuel consumption, or extend the oil change interval by 100%.

C.3 Task 1: Mini Hybrid System on Transit Bus

C.3.1 The contractor shall install the new thermal management components and/or retrofit system (kits) on the transit bus (city transportation bus vehicle). The contractor is responsible for acquiring the transit bus.

C.3.2 The contractor shall perform testing on the bus to verify component function, strength, vibration resistance, dust and particulate resistance, and overall system robustness. The contractor shall analyze all results and submit a technical report describing the work performed, summarizing the test results, and provide recommendations for future work in accordance with CDRL A002.

C.3.3 The contractor shall incorporate the improvements to the new thermal management components and/or retrofit system (kits) into their past vehicle platforms. These shall include the following vehicles provided as GFE:

- FMTV: NSN/2320-01-354-3386, S/N 3522
- Ford Excursion: Light/Medium Duty Commercial Vehicle

The improved system shall also be incorporated into other past vehicle platforms that were not supplied as GFE. These platforms include the Freightliner Century Class S/T, Lockheed LM 4x4, BAE FCS and MULE, John Deere tractors and bulldozers, Peterbilt 387, New Flyer D40LF, International variants, Kenworth T300, Volvo VNL, HMMWV, Mack Vocational, HEMTT, and the Eaton Utility vehicle.

C.4 Task 2: Oil Thermal Management System

C.4.1 The contractor shall investigate technologies to improve the current oil thermal management system developed under Phase I and Phase II. The contractor shall use existing off the shelf technologies available to them via open market or from their own company. These technologies shall include, but not be limited to the following:

C.4.1.1 An oil level sensor used to detect when the oil sump level falls below the minimum allowed by the engine manufacturer.

C.4.1.2 An in-cab warning light or visual indicator telling the operator the oil needs to be replenished.

C.4.1.3 An Oil Exchange Flow Control System that could either:  
Operate oil flow based on fuel flow and not on time  
Incorporate a toggle switch control to allow the system to operate on at least two rates of oil being blended in the fuel.

C.4.1.4 An improved filtration system of the oil before it is added to the fuel.

C.4.1.5 An electric oil pump to be used in fluid replenishment, pre and post lubrication, auxiliary filtration or secondary lube and cooling.

C.4.2 The contractor shall provide design changes/drawings for the oil management system for approval to the COTR in accordance with CDRL A003. The new design shall be able to be implemented as a design change for new vehicles or as a replacement

<b>CONTINUATION SHEET</b>	<b>Reference No. of Document Being Continued</b> <b>PIIN/SIIN</b> W56HZV-06-C-0467 <b>MOD/AMD</b> P00004	<b>Page</b> 7 <b>of</b> 9
<b>Name of Offeror or Contractor:</b> ENGINEERED MACHINED PRODUCTS INC		

kit for the legacy fleet.

C.4.3            The contractor shall finalize the mechanical design of all components. The mechanical design must be able to withstand high levels of heat, vibration, and dust, in accordance with MIL-STD-202G.

C.4.4            The contractor shall build 10 (ten) initial production items based on the approved drawings/proposed changes from C.4.2 and C.4.3 . The contractor shall use these 10 initial production items to conduct bench testing. The bench tests shall include, but not be limited to:

- heat testing in accordance with method 108A, page 37 of MIL-STD-202G.
- vibration testing in accordance with method 201 A, page 67 of MIL-STD-202G
- durability testing in accordance with method 206, page 85 of MIL-STD-202G

After successful bench testing, the contractor shall upgrade the 10 initial production items to meet the required levels of testing (shown above), and submit a Test Report for COR approval in accordance with CDRL A005. After COR approval, the contractor shall build 90 additional production items in the same configuration as the upgraded 10 items. These 100 production items shall meet the required levels of testing (shown above) and shall be used for vehicle testing according to the field test plan developed in C.4.5.

C.4.5            The contractor shall prepare a fleet test plan and schedule which will require coordination and approval by TACOM in accordance with CDRL A002. The contractor shall propose an applicable fleet for test. The number of oil management units to be integrated on engine systems and demonstrated shall be 100 total. These units will be demonstrated on a combination of commercial vehicles, military vehicles, and commercial or military engine stationary power generators. The Government will attempt to make available approximately 10 military platforms, which may consist of military vehicles and/or military stationary power generators. The military vehicles may include a combination of the HMMWV, FMTV, and HEMMTT. The contractor shall provide for the installation and testing of the improved "On-Board-Oil-Exchange" (OBOE) system for these platforms. The contractor shall coordinate with TACOM on visits to gather data from these demonstrations. The minimum length of testing is four (4) oil change intervals with a minimum of 3,000 vehicles miles or 250 stationary generator run-time hours between oil changes.

C.4.6            The contractor shall remove any hardware from any GFE vehicle and return the GFE vehicle to its original working condition.

C.5              Option 2 thru Option 4.

                  In the event the contracting officer exercises any or each of the four option year periods contained in Section H, the contractor shall perform the tasks set forth in paragraphs C.5.1 through C.5.5. The Government will provide a platform for analysis based on the contractor's recommendation, the results of the basic contract effort, and the availability of Government vehicles. Candidate platforms/vehicles may include one of the following:

- A true hybrid of a light, medium, or heavy duty vehicle
- A light, medium, or heavy duty commercial or military vehicle
- An off-highway vehicle such as construction or agricultural equipment
- A bus or urban transport vehicle
- A vehicle from an ongoing advanced vehicle programs such as FTTS or FCS
- A military or commercial vehicle with a fuel cell
- Utility based vehicle
- Marine application
- GenSet (generator)
- A combination of the above.

C.5.1            The contractor shall receive a government-furnished equipment (GFE) vehicle and shall proceed to baseline and characterize the standard coolant & lubrication system. This baseline analysis will include, but not be limited to heat rejection needs in various loads to include the minimum unloaded vehicle and the maximum load capacity of the vehicle. The contractor shall also include an analysis of the thermal/oil management components and/or retrofit system (kits) components such as the valves, pumps, fans, level sensors, on board oil exchange and heat exchangers which include performance, efficiency and energy loss. Available data will be used wherever possible, but the contractor shall perform any additional testing that proves necessary to generate data not already available in reliable form, or not available to a degree complete enough for analysis. This data will identify which components of the baseline system need to be redesigned or reconfigured, to afford the optimal improvements to the current vehicle thermal/oil management system.

C.5.2            The contractor shall model the vehicle's thermal management components and/or retrofit system to perform what-if analysis and determine the optimal configuration of a thermal/oil management system (kits) for that vehicle.

C.5.3            The contractor shall design, produce, and bench test the selected optimal thermal/oil management components and/or

<p style="text-align: center;"><b>CONTINUATION SHEET</b></p>	<p style="text-align: center;"><b>Reference No. of Document Being Continued</b></p> <p style="text-align: center;"> <b>PIIN/SIIN</b> W56HZV-06-C-0467      <b>MOD/AMD</b> P00004         </p>	<p style="text-align: center;"><b>Page 8 of 9</b></p>
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**Name of Offeror or Contractor:** ENGINEERED MACHINED PRODUCTS INC

retrofit system (kits). Bench tests shall include performance and efficiency of all components. The contractor shall define packaging constraints and select the best location for the thermal/oil management system on the vehicle. Any failures in the system or the components of the system will result in a redesign and retest of the system.

C.5.4 The contractor shall install the new thermal/oil management components and/or retrofit system (kits) on the vehicle.

C.5.5 The contractor shall perform testing on the vehicle to verify component function durability and overall system robustness. The contractor shall analyze all results and submit the technical report in accordance with CDRL A005. Describe the work performed, summarize the test results, and provide recommendations for future work.

C.6 Option 1.

The contractor shall perform the tasks set forth in paragraphs C.6.1 through C.6.5. The Government will provide a platform for analysis based on the contractor's recommendation, the results of the basic contract effort, and the availability of Government vehicles. Candidate vehicles/vehicle platforms may include one of the following:

- A true hybrid of a light, medium, or heavy duty vehicle
- A light, medium, or heavy duty commercial or military vehicle
- A bus or urban transport vehicle
- A military or commercial vehicle with a fuel cell
- Utility based vehicle
- GenSet (generator)
- A combination of the above.

C.6.1 The contractor shall receive a government-furnished equipment (GFE) vehicle and shall proceed to baseline and characterize the standard coolant & lubrication system. This baseline analysis will include, but not be limited to heat rejection needs in various loads to include the minimum unloaded vehicle and the maximum load capacity of the vehicle. The contractor shall also include an analysis of the thermal management components and/or retrofit system (kits) components such as the valves, pumps, fans, level sensors, on board oil exchange and heat exchangers which include performance, efficiency and energy loss. Available data will be used wherever possible, but the contractor shall perform any additional testing that proves necessary to generate data not already available in reliable form, or not available to a degree complete enough for analysis. This data will identify which components of the baseline system need to be redesigned or reconfigured, to afford the optimal improvements to the current vehicle thermal management system.

C.6.2 The contractor shall model the vehicle's thermal management components and/or retrofit system to perform what-if analysis and determine the optimal configuration of a thermal management system (kits) for that vehicle.

C.6.3 The contractor shall design, produce, and bench test the selected optimal thermal management components and/or retrofit system (kits). Bench tests shall include performance and efficiency of all components. The contractor shall define packaging constraints and select the best location for the thermal management system on the vehicle. Any failures in the system or the components of the system will result in a redesign and retest of the system.

C.6.4 The contractor shall install the new thermal management components and/or retrofit system (kits) on the vehicle. In addition to the fifty (50) kits currently being installed with this option, an additional twenty (20) kits are added to expand the validation and verification of the system. The contractor shall focus the additional kits on the Michigan fleet of transit buses in order to limit travel and other expenses.

C.6.5 The contractor shall perform testing on the vehicle to verify component function durability and overall system robustness. The contractor shall analyze all results and submit the technical report in accordance with CDRL A005. Describe the work performed, summarize the test results, and provide recommendations for future work.

SECTION G - CONTRACT ADMINISTRATION DATA

LINE	PRON/ AMS CD/ ITEM MIPR	OBLG STAT/ ACRN JOB ORD NO	PRIOR AMOUNT	INCREASE/DECREASE AMOUNT	CUMULATIVE AMOUNT
0004AC	R372C236R3 622601H7700	AE 1 72C236	\$ 0.00	\$ 497,285.00	\$ 497,285.00
0004AD	R372C294R3 622601H7700	AE 1 72C294	\$ 0.00	\$ 48,007.00	\$ 48,007.00
			NET CHANGE	\$ 545,292.00	

SERVICE NAME	NET CHANGE BY ACRN	ACCOUNTING CLASSIFICATION	ACCOUNTING STATION	INCREASE/DECREASE AMOUNT
Army	AE	21 72040000076N6N7EP622601255Y S20113	W56HZV	\$ 545,292.00
NET CHANGE				\$ 545,292.00

	PRIOR AMOUNT OF AWARD	INCREASE/DECREASE AMOUNT	CUMULATIVE OBLIG AMT
NET CHANGE FOR AWARD:	\$ 6,819,835.00	\$ 545,292.00	\$ 7,365,127.00

ACRN	EDI ACCOUNTING CLASSIFICATION
AE 21 070820400000 S20113 76N6N7E622601H7700255Y	72C236S20113 W56HZV
AE 21 070820400000 S20113 76N6N7E622601H7700255Y	72C294S20113 W56HZV